

Installation Instructions

451P

SIZE 108
SERIES B

GAS-FIRED AIR CONDITIONER

bryant

39451D8
Rev. 4/12/65

Installation of the Model 108-451 Gas Air Conditioning Absorption Unit consists of the following steps:

- | | |
|-------------------------------------|-----------------------------|
| I. Locate and Mount Absorption Unit | VI. Check-Out and Operation |
| II. Connect Chilled Water Lines | VII. Adjust Gas Input |
| III. Electrical Connections | VIII. Balance System |
| IV. Gas Connections | IX. Purge Non-Condensibles |
| V. Charge System with Water | |

Each of the above steps is discussed in detail in this instruction. Read the entire instruction before starting installation.

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I. LOCATE AND MOUNT ABSORPTION UNIT

The absorption unit may be located at ground level or on the roof. Consult local codes for information concerning proximity to property lines, height above roof, obstructions, etc.

A. MOUNTING BASE

1. Use non-combustible materials.
2. Suggested types of mounting base for ground installation:

a. Precast concrete lintels.

Use three lintels the depth of unit, one each under right and left end of unit and one at center of unit.

b. Concrete blocks.

Use one block at each corner of unit plus blocks under the two long sides midway between the corner blocks.

c. Concrete slab.

Minimum thickness 4 inches.

3. For installation on a roof or other combustible material leave sufficient clearance between unit sub-base and roof for proper air circulation. Use precast concrete lintels or concrete blocks as described in paragraph 2 above or steel beams. Check local codes.

B. CLEARANCES

1. Absorption unit should have a minimum clearance of 2 feet on all sides from any adjacent obstruction.
2. Avoid locating the unit where hot condenser discharge air can impinge on nearby obstructions and mix with the inlet air supply. The condenser air discharges upward. The unit should be located outside of the plumb line from any over-hang.

II. CONNECT CHILLED WATER LINES

A. MATERIALS

Refer to section on "Freezing Weather Protection" at the end of this instruction.

1. Piping

a. Polyethylene Plastic Pipe — use medium density flexible pipe whose wall thickness approximates Schedule 40 pipe (Commercial Standard CS 197-60). Pipe must be virgin plastic. Do not use pipe manufactured from re-claimed plastic.

b. Copper - satisfactory substitute.

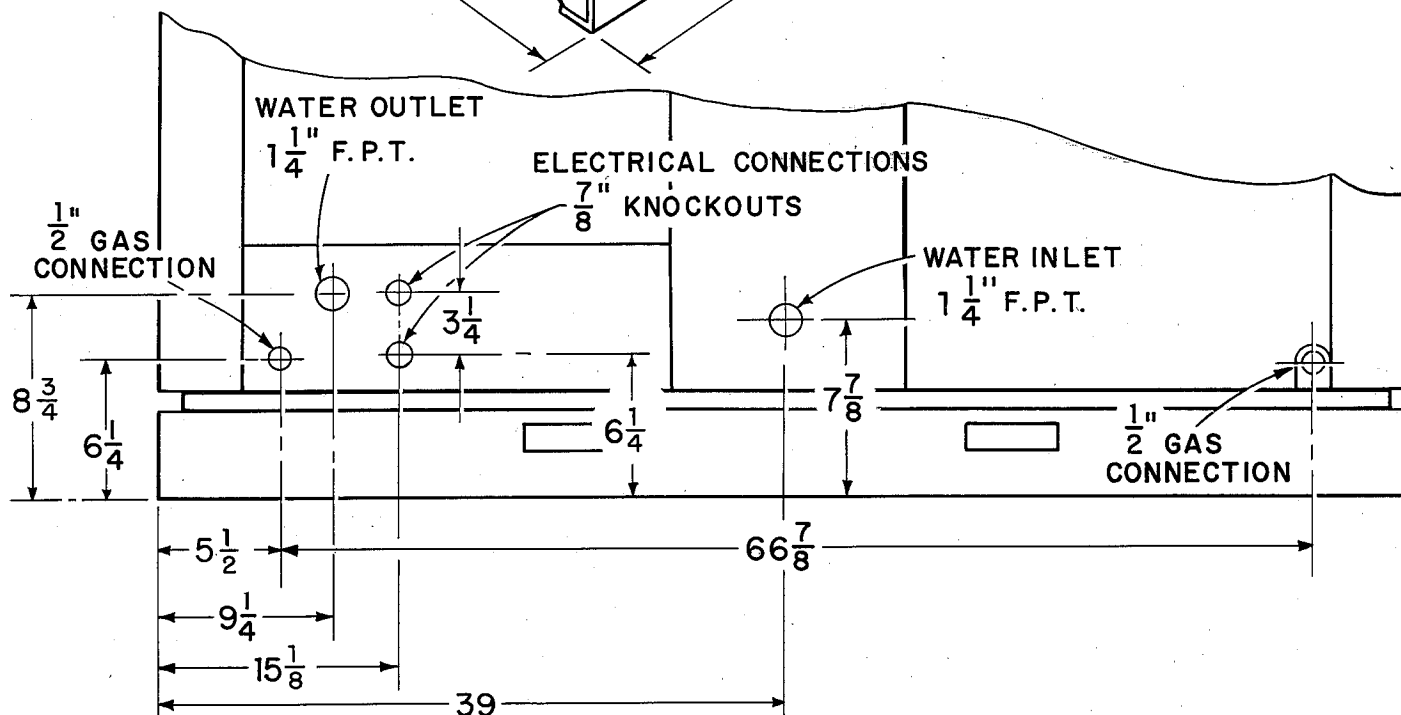
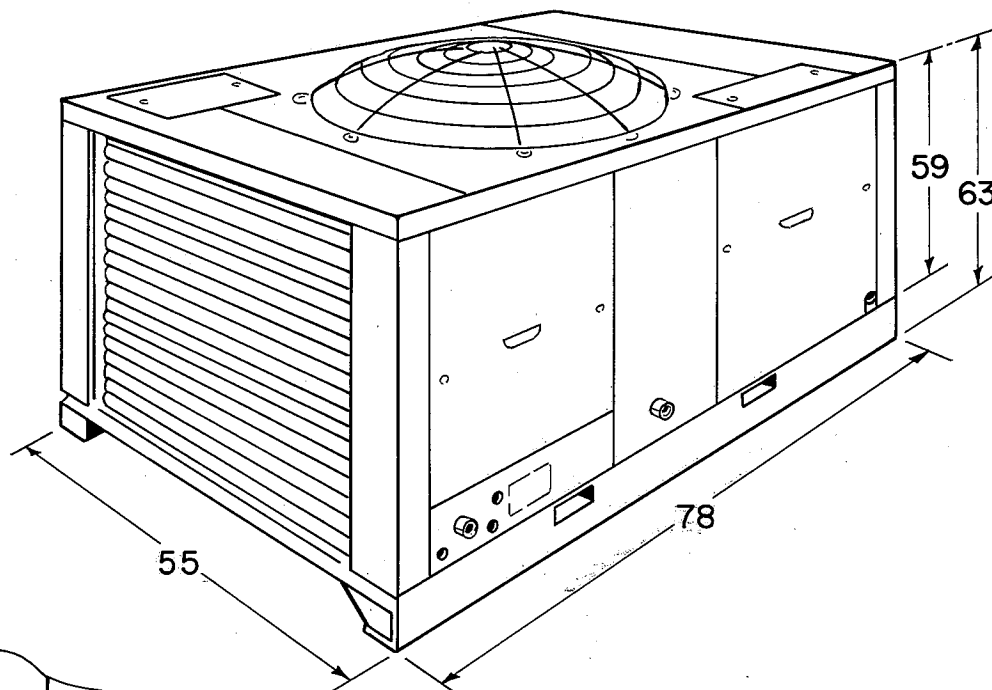
c. Galvanized - satisfactory substitute.

2. Fittings

a. Galvanized - use when possible.

b. Brass - satisfactory substitute.

c. Nylon - satisfactory substitute.



		108-451
Cooling Capacity	BTUH	108,000
Heat Input	BTUH	330,000
Condenser Air Delivery	CFM	14,000
Water Flow (minimum required)	GPM	22
Maximum friction loss handled by Chiller Pump	Ft. Head	45
Maximum elevation of coil above chiller	Ft.	49
Pump Drive 230 v 60 cy 1 phase	HP	1/3
Fan Drive 230 v 60 cy 1 phase	HP	1
Minimum Wire Size *	AWG	12
Refrigerant Type		717
Refrigerant Amount	LB	55
Approximate Shipping Weight	LB	2200

* Satisfactory where distance, measured along wire path, between unit and connection into main panel does not exceed 100 ft. Where distances are longer, wire sizes should be increased accordingly.

Table I

Nominal Pipe Size Inches	Allowable Distance* Between Coil and Chiller		
	Polyethylene Pipe	Copper Pipe	Galvanized Pipe
	Size 108	Size 108	Size 108
1	48'	67'	72'
1 ¼	272'	210'	285'
1 ½	610'	492'	642'

* Note: Values shown in above table are for one direction only. The total length of pipe from chiller to coil and return would be double the above table values. The above table applies to single unit installations only.

B. PIPE LENGTH AND DIAMETER

Table I shows maximum length of pipe of different diameters that can be used between the pump discharge and the coil inlet and still maintain minimum allowable (design) water flow rate.

1. Multiply table values by two to obtain the total length of pipe from chiller to coil and return.
2. Length is measured along the pipe path and therefore includes vertical distance between the water coil and the chiller.
3. Lengths shown in Table I are based on using a total of eight elbows in the entire water line (chiller to coil and return). Lengths are predicated on the use of a Bryant matching water coil. For greater distances use larger pipe or add a pump.

C. INSULATION

1. Insulate supply and return lines separately.
2. Material should be of good quality and be covered with a good vapor barrier. Armaflex or equivalent is recommended.

Wall thickness:

- 1/2" wall thickness - south of 40° N. latitude
- 3/8" wall thickness - north of 40° N. latitude

D. HEIGHT OF COIL

ABOVE ABSORPTION UNIT

Maximum vertical distance from chiller outlet to top of coil is 49 feet. For greater heights, a greater pumping head is required. Increasing the pipe size will not help.

E. WATER COIL CONNECTIONS

1. If cooling coil is used in connection with heating unit, install cooling coil in parallel with or downstream of heating unit to avoid condensation in the heating unit.
2. If coil is located in warm air stream, do not connect polyethylene pipe directly to coil. Connect a minimum of 24 inches copper or galvanized pipe to both the coil inlet and outlet. Then connect the plastic pipe to these nipples.

3. On installations where the outside piping freezes and the coil is in a heated air stream, precautions must be taken to provide for water expansion. The connecting polyethylene plastic pipe acts as an expansion vessel if there is enough footage of this pipe in the heated space (space not subject to freezing). The following table shows the minimum lengths (total inlet and outlet) of plastic piping of various diameters that are required for both sizes of coils to provide adequate expansion volume.

Nominal Pipe Size Inches	Length of Plastic Pipe in Feet
1	70
1 ¼	40
1 ½	29

If the total plastic chilled water line footage in the heated space is not as long as the minimum values shown in the table, tee a vertical pipe of sufficient volume into either of the coil connections to provide for expansion, or the line should be drained.

III. ELECTRIC CONNECTIONS

1. Make all electric connections in accordance with the National Electrical Code and any local ordinances or codes that might apply.
2. Provide a separate power supply for the air conditioner.
3. Provide a fused disconnect switch within sight of and not more than 50 feet from the absorption unit. Use 35 amp standard fuse.
4. The absorption unit is shipped fully wired from the factory. Connection of 230V power and low voltage connection to the thermostat control are required in the field. Before proceeding, inspect factory wiring for loose connections which may have resulted during shipment.

5. Figures 3 & 4 are the Wiring Diagrams for the natural gas unit. Figures 5 & 6 are the Wiring Diagrams for an LPG unit.

6. Disconnect pump electrical lead at terminal 7 in front control box before energizing unit when ready to check field wiring. Do not operate the pump dry.

IV. GAS CONNECTIONS

Consult local gas company before making any gas connections. In case of conflict with this instruction, local requirements should be followed.

Before selecting the size and type of pipe that is to be used for installing the absorption unit, be sure to check with local gas company for the necessary information. The size of the gas pipe to be used between meter and unit will depend upon the length of run and the allowable pressure loss established by the utility.

The gas connections to the unit are made at the 1/2 inch combination regulator-shut offs at each of the two generators. The gas supply pipes enter the unit through openings located at lower left rear and lower right rear of unit. Install 1/2 inch ground joint unions and 1/2 x 3/4 inch ells adjacent to each combination regulator-shut off using two 1/2 inch x close nipples. The gas supply pipe from the meter should terminate at the rear of the unit with a tee. Install 3/4 inch pipe from this tee through the openings in the rear casing to the 1/2 x 3/4 inch ells adjacent to the regulator-shut offs at each generator.

A wrench-type shut-off valve should be installed in the gas supply line within sight of, and convenient to, the 451. It is recommended that ground joint unions be installed in the gas supply piping just outside the unit.

Joint compound (pipe dope) which is resistant to the action of liquefied petroleum gases should be applied sparingly and only to the male threads of the joints.

After gas pipe connections have been made, purge the lines and check for leakage. Use a soap and water solution or other such material. Turn off power supply to unit when purging the lines to prevent glow coils in reignition pilots from being energized. Never use matches, candles, flame or other source of ignition to check leakage.

PILOT

The natural gas unit is equipped with two reignition type pilots (one pilot in each generator). The pilots will light automatically when supplied with gas and are electrically energized. The circuit is arranged to light the pilots sequentially. Several minutes must be allowed for the first pilot to ignite and make contact before second pilot will be energized.

To manually light the pilots use the procedure outlined on the Lighting Instruction Plate attached to generators. The pilot flame should be soft blue in color. The flame should be of sufficient length to provide good impingement on the unimetal element of the Bryant pilot. Flame should extend upward between the carry-over ports of the two adjacent burners.

If the pilot flame does not have the appearance described above, it may be adjusted by means of the manual pilot shut-off valve which is equipped with an adjustable screw. Turn the handle to the full-open position and remove the screw cap on the valve handle, thus exposing the adjustable screw. Turn adjusting screw until flame has the desired appearance. Replace screw cap.

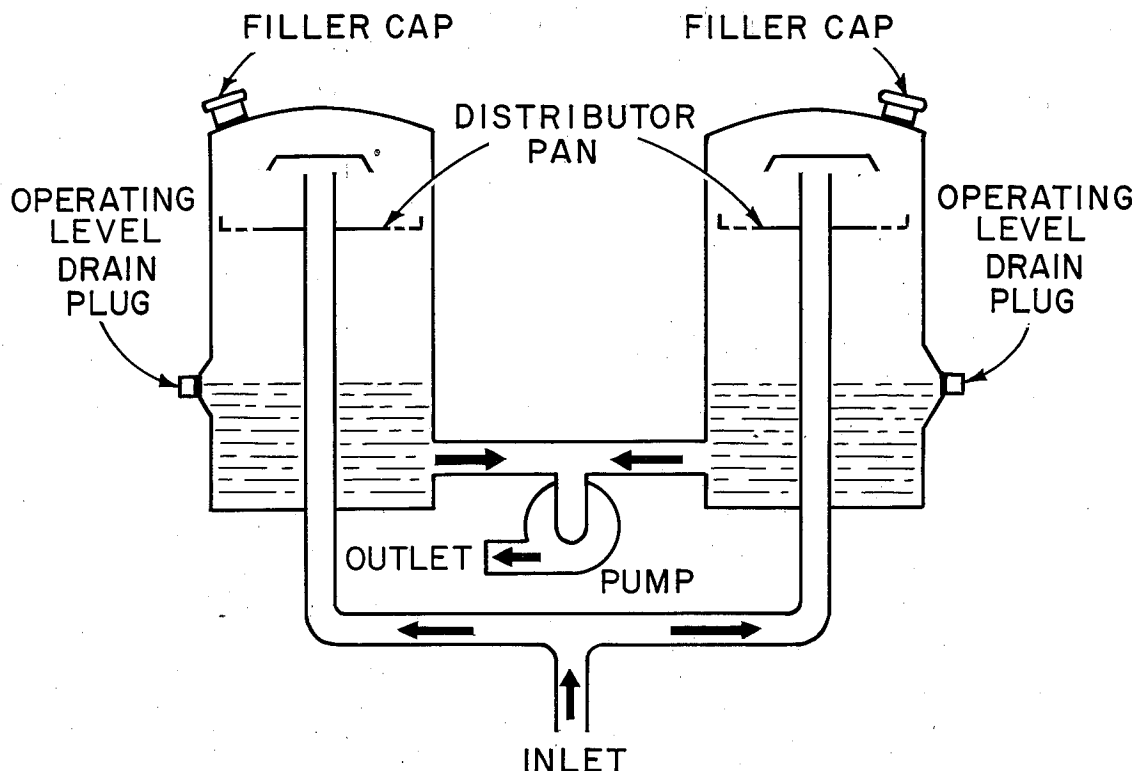
V. CHARGING THE SYSTEM WITH WATER

Caution: Do not run the pump dry. Freezing conditions will not damage the pump; however, do not attempt to operate the pump when chiller or chilled water lines are frozen.

1. Turn off main manual gas shut-off valve.
2. Remove the filler caps located on top of both chiller tanks.
3. Disconnect water line at chiller inlet. (When installing the chilled water lines, it is advisable to leave this connection open until lines have been flushed.)
4. Fill tanks with tap water through the filler opening of one tank until the distributor pans are covered with water. A garden hose is useful for this filling operation.

5. Start pump. Continue to supply water to the tank and operate pump until all foreign matter has been flushed from the lines. Then remove hose.

Note: If water does not circulate when the pump is started, air may be trapped in the pump. Bleed the air from pump through the 1/8 inch slotted head



bleed valve located on top of the pump discharge. Open valve with screwdriver. Close valve when the trapped air is removed and water appears.

6. Remove operating level drain plug of either chiller and continue to operate pump until water stops flowing from drain opening.

7. Turn off pump. Make pipe connection to chiller inlet.

8. Replace operating level drain plug finger tight. Add several gallons of water to tanks to raise water level above drain opening.

9. Start pump. Adjust water level with pump running. This is accomplished by removing one drain plug. When water ceases to drain, the level is properly adjusted in both chiller tanks.

10. Add contents of two chilled water additive packages to chiller tank through filler opening at top of tank. The two packages supplied is sufficient for chilled water systems containing up to 40 gallons of water. For systems larger than 40 gallon capacity, add 1/2 package for each additional 10 gallon capacity or fraction thereof. To estimate chilled water capacity of system refer to Table II.

11. Replace filler caps.

12. The system is now ready to operate.

Table II
Water Capacity in Gallons

108-451 Chiller	19.4
Bryant 1 1/2 ton coil	0.6
Bryant 3 ton coil	1.0
Bryant 4 1/2 ton coil	1.5
Bryant 9 ton coil	3.0
1 ft. of 1 inch pipe	0.05
1 ft. of 1 1/4 inch pipe	0.08
1 ft. of 1 1/2 inch pipe	0.11

VI. CHECK OUT AND OPERATION

1. Be sure main manual gas valve is off. Light pilots as described on instruction plate.

2. Set thermostat to 'cool'; set thermostat fan switch to 'auto'; set thermostat below room temperature.

3. Turn on main electric switch to unit.

4. Check indoor fan operation by turning thermostat fan switch to 'on' for continuous fan operation. Move thermostat above room temperature and observe that the indoor fan remains on.

5. To place the system in operation, open the main manual gas valve, replace all panels, and set the thermostat at the desired temperature.

High Temperature Cut-Off

The high temperature circuit includes two high temperature controls - one located on the front of each generator plus a high temperature relay (lockout relay) located in the front control box. If either generator becomes overheated the contacts in its high temp control open, causing the high temp relay to go into lockout position. The gas valves close, the fan and pump stop, and will not recycle until the lockout relay is reset. To reset lockout relay turn electric power off and then back on. Be sure to locate and correct cause of high temp cut-out.

Example: Natural Gas
1025 BTU
0.63 Specific Gravity

1. From Table III manifold pressure is 3.2 inches w.c.
2. With manometer connected to manifold 'A' set pressure at 3.2 inches by adjusting gas pressure regulator.
3. With manometer connected to manifold 'B' set pressure at 3.2 inches by adjusting gas pressure regulator.

Table III - Manifold Pressure
(Inches w.c.)

BTU Value		Specific Gravity				
		0.59	0.61	0.63	0.65	0.67
	900	3.9"	4.0"	4.1"	4.2"	4.3"
	950	3.5"	3.6"	3.7"	3.8"	3.9"
	1000	3.1"	3.2"	3.3"	3.4"	3.5"
	1025	3.0"	3.1"	3.2"	3.3"	3.4"
	1050	2.8"	2.9"	3.0"	3.1"	3.2"
	1100	2.6"	2.7"	2.8"	2.9"	3.0"

VII. ADJUST GAS INPUT

The gas input of the Model 108-451 is 330,000 BTUH or 165,000 BTUH for each of the two generators. For operation on natural gas the burners are equipped with fixed orifices drilled #39. The adjustable gas pressure regulator is set at the factory for 3.0 inches w.c. manifold pressure.

It is necessary to check manifold pressures with a manometer, whether the gas is measured at the meter or the input is set by manifold pressure according to Table III.

When measuring gas at the meter also check pressures at both generator manifolds with a manometer. The pressures at both manifolds must read the same to insure equal input to each generator. A 1/4 inch pressure tap is located on each manifold for connecting the manometer.

If it is not possible to measure the gas input at the meter refer to Table III to procure the manifold pressure required for the btu value and specific gravity of the gas to be supplied to the unit. With the manometer connected to one manifold set the pressure by adjusting the gas pressure regulator. Repeat the same procedure to set the pressure at the manifold of the second generator.

VIII. BALANCE THE SYSTEM

After the unit is in operating and the input has been measured and adjusted to agree with the rating plate requirements, balance the system.

Any approved method of checking the air flow over the water coil may be utilized. Reference is made to the Bryant Service Manual on Gas Air Conditioners for a review of standard methods.

IX. PURGE NON-CONDENSIBLES

Purging is accomplished through valves A on inlet tanks and valves D on purge pots. Each refrigeration circuit must be checked.

Operate unit for a minimum of 15 minutes. While still operating, proceed as follows:

1. Attach adapter and purge line to valve A.
 2. Run purge line to bucket of water.
 3. Remove cap and open valve A about 1/8 to 1/4 turn.
 4. If non-condensibles are present, bubbles will rise to the surface of the water in the bucket.
 5. Leave valve A open as long as bubbles rise to the surface of the water. When non-condensibles are removed the bubbles will cease as ammonia will be absorbed into the water.
 6. Close valve A.
 7. Open valve D about 1/8 turn. Usually there will be some solution trapped in the valve body, and this solution will be released as soon as the valve is opened.
 8. If non-condensibles are present they will follow the initial surge of solution. When solution reappears in quantity, the non-condensibles trapped in the purge pot have been released.
 9. Close valve D.
 10. Repeat procedure for other circuit.
- The installation should now be complete.

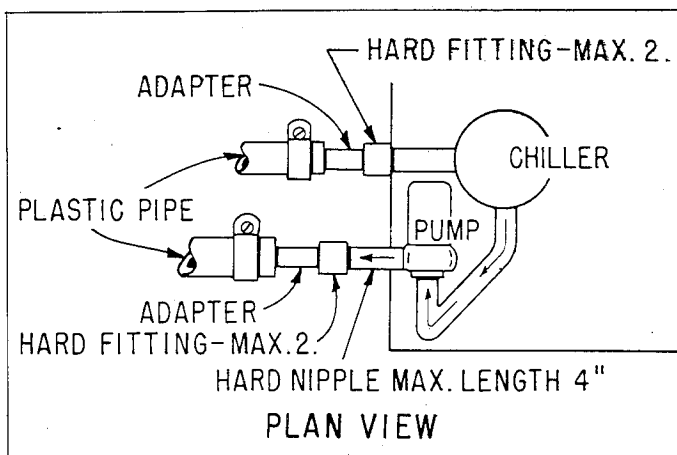


Figure 2

FREEZING WEATHER PROTECTION

Gas Air Conditioner

The Gas Air Conditioner has built-in freeze protection sufficient to protect the chiller and pump plus a small amount of external hard (non-plastic) pipe as shown in Figure 2.

Chilled Water Pipes

If hard pipe (non-plastic) is used for the chilled water lines, it will be necessary to drain the lines or add anti-freeze. The recommended anti-freeze is methanol (uninhibited methyl alcohol). Since the fluid will not be pumped, only enough methanol is required to form slush. Add one gallon of methanol for each 20 gallons of water or fraction thereof, and circulate 10 minutes. The chilled water additive (Borax) must be used in the same proportion as indicated in Section V when anti-freeze treatment is required.

Chilled Water Coil

If water coil is subject to freezing temperatures, it will be necessary to protect the coil by the addition of anti-freeze. Chilled water coils cannot be completely drained. Add one gallon of methanol for each 20 gallons of water or fraction thereof, and circulate 10 minutes. The chilled water additive (Borax) must be used in the same proportion as indicated in Section V when anti-freeze treatment is required.

Operation at Freezing Temperatures

If the air conditioning system is to operate under freezing conditions, it will be necessary to add methanol in the amount required to protect to the lowest outdoor temperature. Consult your Bryant distributor for recommended procedure.

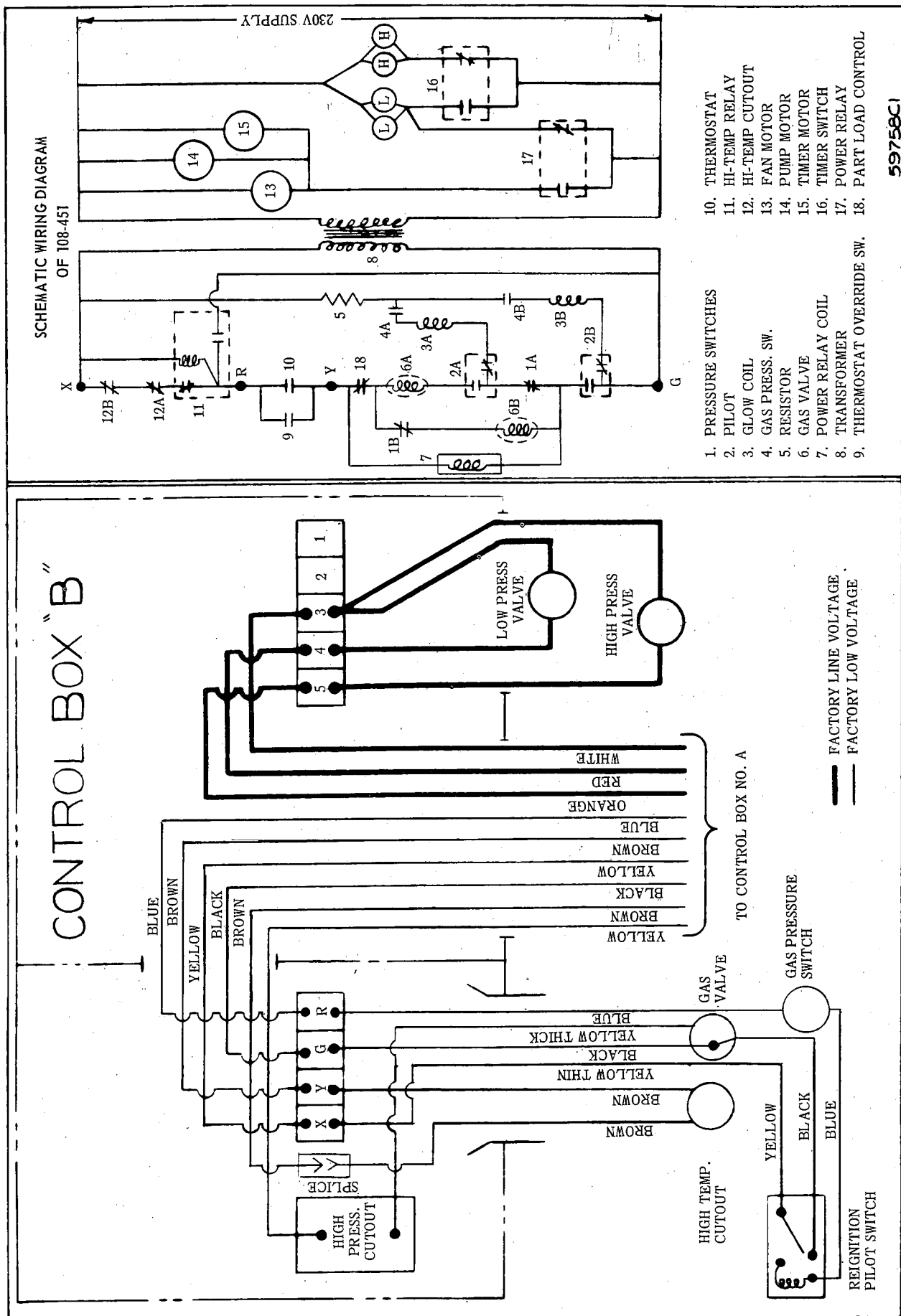


Figure 4 – Unit Wiring Natural Gas - Control Box B
With Reignition

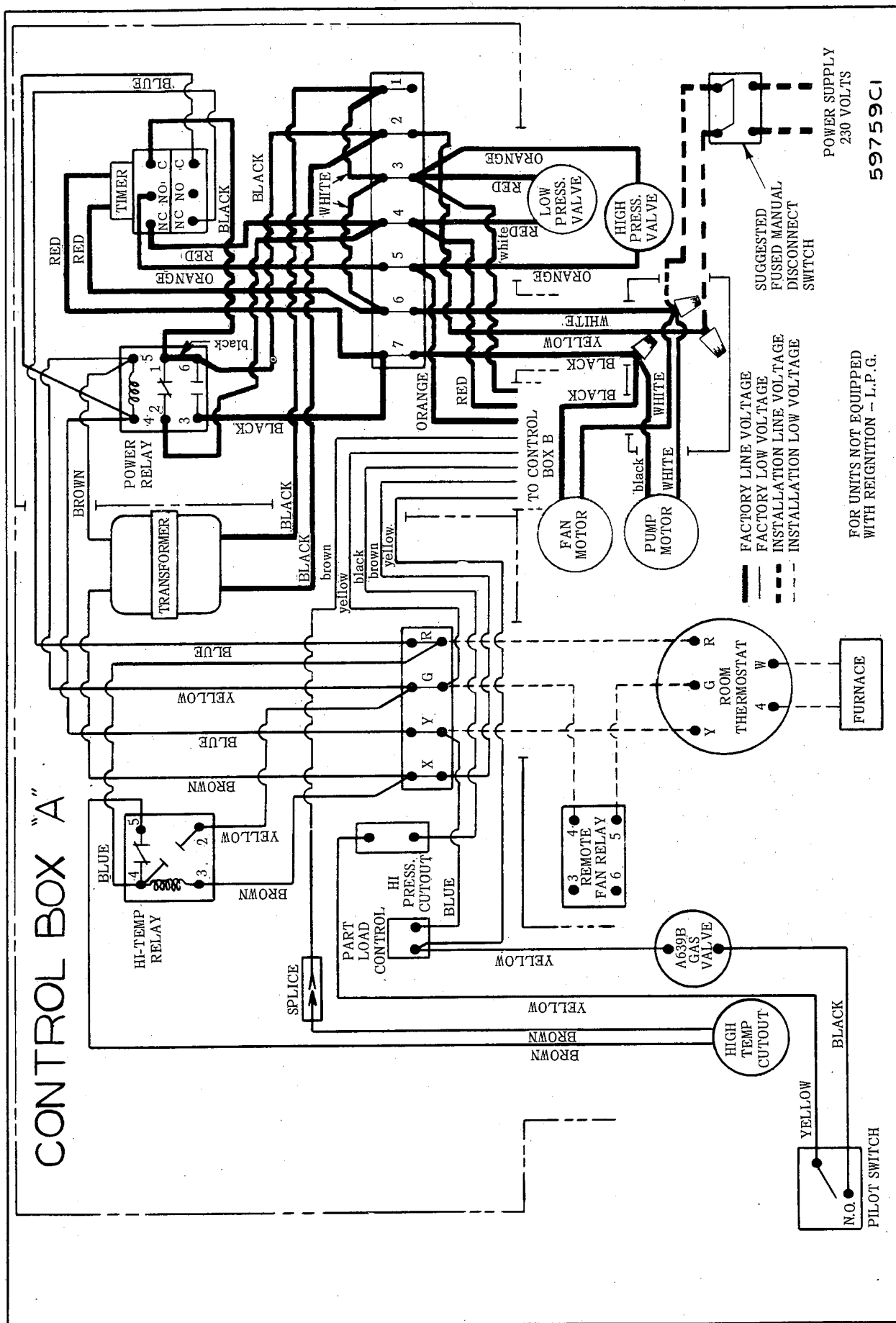


Figure 5 - Unit Wiring LP Gas - Control Box A
No Reignition

